

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
3 June 2004 (03.06.2004)

PCT

(10) International Publication Number  
**WO 2004/047333 A2**

(51) International Patent Classification<sup>7</sup>: **H04B 7/06**  
(21) International Application Number:  
PCT/CA2003/001747

(22) International Filing Date:  
18 November 2003 (18.11.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/427,229 19 November 2002 (19.11.2002) US

(71) Applicant (for all designated States except US): **TENXC WIRELESS** [CA/CA]; 350 Terry Fox Drive, Suite 310, Ottawa, Ontario K2K 2W5 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **WU, Shiquan** [CA/CA]; 108C Craig Henry Drive, Nepean, Ontario K2G 6L8 (CA). **LITVA, John** [CA/CA]; 73 Harold Street, Almonte, Ontario K0A 1A0 (CA).

(74) Agents: **SMITH, Dallas, F. et al.**; Gowling Lafleur Henderson LLP, Suite 2600, 160 Elgin Street, Ottawa, Ontario K1P 1C3 (CA).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

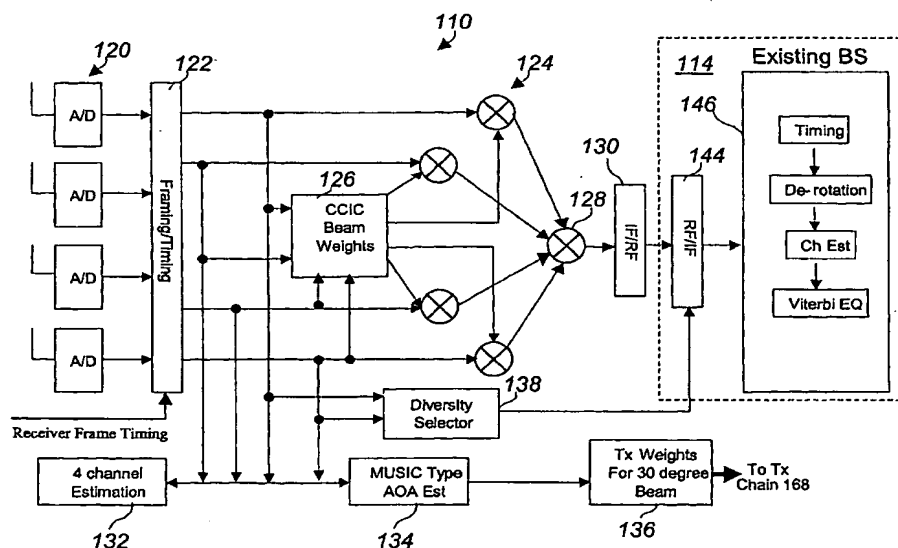
(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **HYBRID SPACE-TIME DIVERSITY BEAM FORMING SYSTEM**



(57) **Abstract:** A method of beam forming is provided for an appliqué intelligent antenna system. The appliqué system uses a watchdog function to monitor broadcast channels of an existing mobile wireless base station to which it is attached. The appliqué system synchronizes itself in frequency and time to the base station. In GSM timing delays are used to prevent collision of timeslots from various mobile terminals. The appliqué system uses this time delay mechanism to compensate for its own processing delays so that its presence is transparent to the existing base station. Angle of arrival calculations are made to determining beamforming parameters. The antenna of the four element antenna system are separated by is  $(5^{1/2}-1)/2$  times the wavelength. Angle of arrival for the strongest uplink multipath signal are used to direct the downlink beam.